reference states that chemotherapeutic agents may be used, but there is no description that the agents are for treating cancer in the brain. Accordingly, Kreuter et al. fail to describe the claimed invention and Claims 35-54 are not anticipated by that reference. Withdrawal of this ground of rejection is respectfully requested.

The rejection of the claims under 35 U.S.C. §102(e) over Sabel et al. [sic, §102(a) since the reference is not a U.S. patent reference] is respectfully traversed. This reference fails to describe the claimed invention.

Sabel et al. describe nanoparticles which may be used to deliver drugs to a specific target within or on a mammalian body (see the Abstract). The references describes that the drugs may be delivered across the blood-brain barrier to the central nervous system. Nowhere do Sabel et al. describe the treatment of brain cancer using the nanoparticles described therein. Therefore, the reference fails to describe the claimed invention.

The rejection of the claims under 35 U.S.C. §103(a) over Kreuter et al. in view of Sabel et al. and Stainmesse et al. (U.S. patent No. 5,133,908) is respectfully traversed.

As discussed above, Kreuter et al. and Sabel et al. fail to describe the treatment of brain cancer. Stainmesse et al. describe a process for preparing nanoparticles (see the Abstract). That reference also fails to describe treating brain cancer.

The cited references fail to suggest the claimed nanoparticles and method of treating brain cancer. The fact that Kreuter et al. and Sabel et al. describe anti-cancer agents that can be delivered across the blood-brain barrier does not suggest the treatment of brain cancer.

The term "blood-brain barrier" does not mean something which exclusively provides a barrier between the blood and the brain per se. Rather, one skilled in the art would understand that this term refers to a "selectively permeable between the blood and the central nervous system (CNS) allowing an active control of an exchange of substances between (and transported by) the bloodstream and the CNS; suitable to prevent deleterious substances from

coming into contact with nerve cells." See, for example, Pschyrembel, Klinisches Worterbuch [Clinical Dictionary], 255th edition, Walter de Gruyter Publishers, Berlin, New York, 1985. This definition demonstrates that the blood-brain barrier has, in the narrower sense, no meaning directly connected to the brain. Hence, one reading these references would not have been motivated to treat brain cancer.

It was already known, as described in the present specification at page 1, last paragraph, that the blood-brain barrier may be passed for the treatment of brain cancer, i.e., mechanically by opening the skull and delivering a certain amount of an anticancer agent (e.g., an immunosuppressive agent) directly into the brain. However, even if such an approach was used, one had to rely on very small amounts of the anticancer drug which is transported to the brain.

In contrast, in the present invention, it was discovered that even small amounts of the anti-cancer drug were very effective and could be directly sent to the brain, in contrast to the expectations from the prior art. In addition, the typical side effects were not observed.

The Example of the present application demonstrates that the claimed nanoparticles could be used to treat glioblastomas (i.e., severe brain tumors) using amounts of an anti-cancer agent which is about half of the amount normally used for the treatment of glioblastomas in mice. See the present specification at page 9, third paragraph.

The cited references fail to suggest that the nanoparticles of the present invention could be used to treat brain cancer so effectively. Therefore, the claims are not obvious over those references. Accordingly, withdrawal of this ground of rejection is respectfully requested.

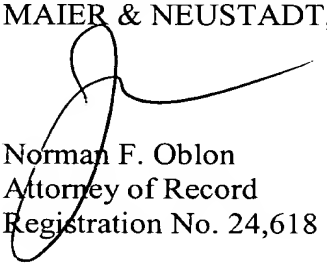
The rejection of the claims under 35 U.S.C. §112, second paragraph, is believed to be obviated by the amendment submitted above. The definitions of the trademarked materials

have been incorporated into the specification and are recited in the claims. Accordingly, withdrawal of this ground of rejection is respectfully requested.

Applicants submit that the present application is in condition for allowance. Early notice to this effect is earnestly solicited.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.



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Marked-Up Copy
Serial No: 09/774,181
Amendment Filed on: HEREWITH

IN THE SPECIFICATION

Please amend the specification as follows.

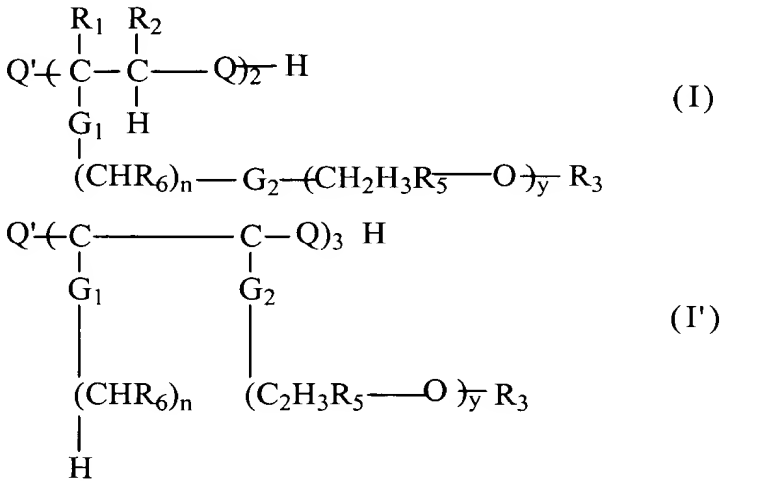
--Page 6, line 22 to page 7, line 4, please amend as in the marked-up copy to read as follows:

--In a preferred embodiment of the present inventive use, the material(s) of the stabilizer/surfactant is/are selected from the group consisting of stabilizers/surfactants which allow a passage of said nanoparticles including said physiologically effective substance(s) across the blood brain barrier in said mammal and stabilizers/surfactants which allow a release of said physiologically effective substance(s) from said nanoparticles and a passage of said substance(s) across the blood brain barrier separate from the nanoparticles. It is furthermore preferred that said stabilizer/surfactant comprises a substance selected from the group consisting of polysorbates, dextrans, carboxylic acid esters of multifunctional alcohols, polyoxamers, polyoxamines, alkoxylated ethers, alkoxylated esters, alkoxylated mono-, di and triglycerides, alkoxylated phenols and diphenols, substances of the Genapol^{R} and Bauki^{R} series, metal salts of carboxylic acids, metal salts of alcohol sulfates and metal salts of sulfosuccinates and mixtures of two or more of said substances, wherein said Genapol^{R} substances are of the formula

$$CH_3(CH_2)_y - (O\text{-}CH_2\text{-}CH_2)_x\text{-}OH$$

wherein y is in the range of 4 to 18 and x is in the range of 1 to 18,

and said Bauki^{R} substances are of the formulas (I) or (I')



(I)

(I')

in which R_1, R_2, R_5 and R_6 are identical or different and represent hydrogen and a methyl or ethyl group,

Q represents a valency, oxygen or an ester or amide bridge and Q' denotes hydrogen if Q represents a valency or oxygen, and is a hydroxyl or amino group if Q represents an ester or amide bridge,

x is an integer from 3 to 50, if Q is a valency or oxygen, and an integer from 3 to 1000 if Q is an ester or amide function, G_1 and G_2 are a valency, oxygen or an ester or amide group, it being possible for the two groups to be identical or different, n is an integer from 4 to 44,

y is an integer from 2 to 50, and R_3 is hydrogen or a lower alkyl having 1-6 C atoms.

IN THE CLAIMS

Claims 11 and 15-34 (Cancelled).

Claims 35-54 (New).--

Enclosure 2

land: CRC 1974; Schormüller, S. 501–521; Torrey, Dehydration of Fruits and Vegetables, Park Ridge: Noyes 1974; Tressler u. Woodroof, Fruit, Vegetable and Nut Products, Westport: Avi 1976; White, Nutritional Qualities of Fresh Fruits and Vegetables, Mount Kisco: Futura 1974; Winnacker-Küchler (3.) *3:* 523–529; zahlreiche weitere Publikationen erscheinen bei Avi (Westport); s. a. die einzelnen G.-Sorten u. *Fruchtsäfte; ältere *Lit.* s. 7. Aufl. dieses Werkes.

... gen (von griech.: genes = verursachend, verursacht). Suffix in wissenschaftlichen Bez., das eine „etwas erzeugende" od. „aus etwas erzeugte" Eig. andeuten soll; *Beisp.:* Pyrogene (machen Fieber), Kollagen (Leimbildner), Hydrogen (Wasserbildner), exogen (von außen eingeführt). – *E* ... gen – *F* ... gène

Genagen®. Fettsäurealkanolamidpolyglykolether (G. CA-050) als grenzflächenaktiver Waschrohstoff bzw. Ölsäurepolyglykolester (G. O-150) als nichtion. Sammler für die Erzflotation.
B.: Hoechst.

Genakor®. Kautschuk- u. Kunststoffauskleidungen als Oberflächenschutz für App., Behälter, Armaturen u. Rohrleitungen.
B.: Kalle.

Genamin®. Tensidrohstoffe auf der Basis von Fettaminen, deren Polyglykolethern u. quartären Ammoniumverbindungen.
B.: Hoechst.

Genaminox®. Alkyldimethylaminoxid als nichtion. Tensid von Hoechst.

Genantin®. Gefrierschutzmittel auf Glykolbasis von Hoechst.

Genapol®. Wasch-, Netz- u. Dispergiermittel auf der Basis von Alkylpolyglykolethern u. Ethylenoxid-Propylenoxid-Blockpolymeren bzw. kosmet. Rohstoffe auf Basis Alkylpolyglykolethersulfat, Alkylsulfat u. Fettsäureglykolestern, auch mit seiden- od. perlglanzgebenden Zusätzen.
B.: Hoechst.

Genauigkeit. Beim *Messen versteht man unter G. stets die Differenz zwischen einem Ergebnis (od. einem Mittelwert) u. dem wahren Wert der zu bestimmenden Größe, unter *Präzision* dagegen die Abweichungen unter den Ergebnissen, d. h. deren Streuung. G. gibt also den Grad der *Näherung*, die Präzision den Grad der **Reproduzierbarkeit* bei Best. u. Messungen an. – *E* accuracy
Lit.: Compilation of ASTM Standards on Precision and Accuracy for Various Applications, Philadelphia: ASTM 1977; DIN 1319, T3 (Jan. 1972); Eisenhart, Science 160 (1968) 1201; Kateman u. Pijpers, Quality Control in Analytical Chemistry, New York: Wiley 1981; Ku, Precision Measurement and Calibration, Washington: Nat. Bur. Standards 1969; Pharm. Biol. *4:* 58–60; Pure Appl. Chem. 53 (1981) 1805–1825; Reproducibility and Accuracy of Mechanical Tests (STP 626), Philadelphia: ASTM 1977; Tölg, Naturwiss. 63 (1976) 99–110; s. a. *Messen.

Genchirurgie s. *Gene u. *Gentechnologie.

Gene. Von Johannsen (1909) geprägter u. von griech.: genos = Geschlecht, Gattung, Nachkommenschaft abgeleiteter Begriff für die Erbanlagen der Lebewesen. Im Sinne der klassischen *Genetik (Vererbungslehre) sind G. biolog. Einheiten, die in den *Chromosomen lokalisiert u. durch die Fähigkeit zur Merkmalsauslösung, zur identischen Reproduktion u. zur Mutation definiert sind. Die *Merkmalsauslsg.* läßt sich in zahlreichen Erbexperimenten nachweisen, bei denen man den Erbgang von Merkmalen wie Haar- u. Augenfarbe, Struktureigentümlichkeiten, Auftreten od. Fehlen von Stoffwechselprod. u. v. a. verfolgt u. dabei eine Vererbung dieser Merkmale nach bestimmten Gesetzmäßigkeiten registriert. Erste Experimente dieser Art stellte G. Mendel (1865) an, der die später nach ihm benannten Vererbungsgesetze formulierte. Die Fähigkeit zur *ident. Reproduktion* der G. läßt sich aus der *Reproduzierbarkeit der Erbexperimente ableiten u. aus der Tatsache, daß eine bestimmte Organismenspezies über lange Zeiträume u. Generationenfolgen in ihren Merkmalen konstant bleibt; ihre G. müssen sich also über diese Zeiträume oftmals ident. reproduziert haben. Weiter führen diese Überlegungen zu dem Schluß, daß die G. in den Chromosomen lokalisiert sind; denn dies sind diejenigen Organellen der *Zellen (vgl. die Abb. dort), die bei jeder Zellteilung von Generation zu Generation weitergegeben werden (s. *Mitose). Genet. Material findet sich jedoch nicht nur im Zellkern, sondern auch in *Mitochondrien u. – in Pflanzen – in den *Plastiden, vgl. a. *Chloroplasten u. Wild (Umschau 76 (1976) 477–483). In relativ seltenen Fällen verändert sich ein G. plötzlich, es mutiert und wird in dieser veränderten Form weitervererbt – falls die Mutation nicht letal ist (Crow, Spektrum Wiss. 1979, Nr. 4, S. 28–38). Solche *Mutationen* sind die Voraussetzung für die Entw. neuer Arten; sie können spontan, durch energiereiche *Strahlung (Ehling, Umschau 80 (1980) 754–759) u. durch Chemikalien entstehen (s. *Mutagene u. *Teratogene u. vgl. Bayer, Pharmazie uns. Zeit 8 (1979) 11–17). Verständlicherweise bemüht man sich, für züchterische u. a. wissenschaftliche Zwecke G. von äußeren Einfl. frei in sog. *Genbanken* aufzubewahren (Bass, Umschau 73 (1973) 229–232).

Die *Molekularbiologie hat in den Forschungen der letzten 40 Jahre die *Desoxyribonucleinsäure (DNA) als Gensubstanz identifiziert. Ein G. ist ein bestimmter Abschnitt der DNA (bei einigen Viren auch der *Ribonucleinsäure, RNA), der durch seine spezif. Basensequenz die Synthese eines spezif. Proteins

Enclosure 3: see page 2

Properties of Detergents (Amphiphiles)

from Dr. Shaun D. Black (University of Texas Health Center at Tyler)

Non-ionic Detergents | Ionic Detergents | Zwitterionic Detergents | Footnotes | References

Non-Ionic Detergents

Detergent Name †	Purity ‡	MW (monomer)	CMC (mM)§	CMC Conditions	Aggregation #	MW (micelle)
APO-10	M	218.3	4.6	50 mM Na^+	131	28,597
APO-12	M	246.4	0.568	50 mM Na^+	2232	549,965
BRIJ-35 ($C_{12}E_{23}$)	M	1200 (avg)	0.09	50 mM Na^+	40	
C_8E_6	M		9.9	25° C	32	13,000
$C_{10}E_6$	M	427.1	0.9	50 mM Na^+	40	17,084
$C_{10}E_8$	M	515.1				
$C_{12}E_6$	M	451.1	0.087	50 mM Na^+		
$C_{12}E_8$ (Atlas G2127)	M	539.1	0.11	50 mM Na^+	123	66,309
$C_{12}E_9$	M	583.1	0.08	50 mM Na^+		
$C_{12}E_{10}$ (Brij 36T)	M		0.2			
$C_{16}E_{12}$	M		0.0023	25° C	152	117,000
$C_{16}E_{21}$	M		0.0039	25° C	70	82,000
Cyclohexyl-*n*-ethyl-ß-D-Maltoside	M	452.5	120	50 mM Na^+		
Cyclohexyl-*n*-hexyl-ß-D-Maltoside	M	508.6	0.56	50 mM Na^+		
Cyclohexyl-*n*-methyl-ß-D-Maltoside	M	438.5	340	50 mM Na^+		
n-Decanoylsucrose	M	496.6	2.5	50 mM Na^+		
n-Decyl-ß-D-glucopyranoside	M	320.4	2.2	50 mM Na^+		
n-Decyl-ß-D-maltopyranoside	M	482.6	1.6	50 mM Na^+		
n-Decyl-ß-D-thiomaltoside	M	498.6	0.9	50 mM Na^+		
Digitonin	M	1229.3			60	70,000
n-Dodecanoyl	M	524.6	0.3			

sucrose				50 mM Na^+		
n-Dodecyl-ß-D-glucopyranoside	M	348.5	0.13	50 mM Na^+		70,000
n-Dodecyl-ß-D-maltoside	M	348.5	0.15	50 mM Na^+	98	70,000
Genapol C-100	P	627 (avg)				50,000
Genapol X-80	P	553 (avg)	0.06-0.15	50 mM Na^+		
Genapol X-100	P	641 (avg)	0.15	50 mM Na^+	88	56,000
HECAMEG	M	335.4	19.5	50 mM Na^+		
Heptane-1,2,3-triol	M	148.2				
n-Heptyl-ß-D-glucopyranoside	M	278.3	79	50 mM Na^+		
n-Heptyl-ß-D-thioglucopyranoside	M	294.3	30	50 mM Na^+		
LUBROL PX	P	582	0.006	50 mM Na^+	110	64,000
MEGA-8 (Ocatanoyl-N-methylglucamide)	M	321.5	58	50 mM Na^+		
MEGA-9 (Nonanoyl-N-methylglucamide)	M	335.5	19-25	50 mM Na^+		
MEGA-10 (Decanoyl-N-methylglucamide)	M	349.5	6-7	50 mM Na^+		
n-nonyl-ß-D-glucopyranoside	M	306.4	6.5	50 mM Na^+		
Nonidet P-10 (NP-10)	P					
Nonidet P-40 (NP-40)	M	603.0	0.05-0.3	50 mM Na^+	100-155	
n-Octanoyl-ß-D-glucoslyamine (NOGA)	M	305.4	80	50 mM Na^+		
n-Octanoyl sucrose	M	468.5	24.4	50 mM Na^+		
n-Octyl-*alpha*-D-glucopyranoside	M	292.4	20			
n-Octyl-ß-D-glucopyranoside	M	292.4	25	50 mM Na^+	27	7,895
n-Octyl-ß-D-maltopyranoside	M	454.5	23.4	50 mM Na^+		
PLURONIC F-68	P	8400 (avg)				
PLURONIC F-127	P	12,600 (avg)				
THESIT		583	0.1	50 mM Na^+		
TRITON X-100 (*tert*-C_8-Ø-$E_{9.6}$; like NP-40)	P	650 (avg)	0.3	50 mM Na^+	140	90,000
TRITON X-100 hydrogenated	P	631 (avg)	0.25	50 mM Na^+		

TRITON X-114 (*tert*-C_8-Ø-E_{7-8})	P	537 (avg)	0.35	50 mM Na^+		
TWEEN 20 (C_{12}-sorbitan-E_{20}; Polysorbate 20)	P	1228 (avg)	0.059	50 mM Na^+		
TWEEN 40 (C_{16}-sorbitan-E_{20})	P		0.027			
TWEEN 60 (C_{18}-sorbitan-E_{20})	P		0.025			
TWEEN 80 ($C_{18:1}$-sorbitan-E_{20})	P	1310 (avg)	0.012	50 mM Na^+	58	75,980
n-Undecyl-ß-**D**-maltoside	M	496.6	0.59	50 mM Na^+		

Ionic Detergents

Detergent Name †	Purity ‡	MW (monomer)	CMC (mM)§	CMC Conditions	Aggreg-ation #	MW (micelle)
Caprylic acid, Na^+ salt (*n*-octanoate)	M	166.2	351			
Cetylpyridinium chloride	M	274.0	0.90			
CTAB (Cetyltri-methylammonium bromide)	M	364.5	1.0	50 mM Na^+	170	62,000
Cholic acid, Na^+ salt	M	430.6	4	50 mM Na^+	3	1200
Decanesulfonic acid, Na^+ salt	M	244.3	32.6			
Deoxycholic acid, Na^+ salt (DOC)	M	414.6	1.5	50 mM Na^+	5	2000
Digitonin	P	1229	0.087		60	70,000
Dodecyltrimethyl-ammonium bromide	M	308.4	14			
Glycocholic acid, Na^+ salt	M	487.6	7.1	50 mM Na^+	2.1	1000
Glycodeoxycholic acid, Na^+ salt	M	471.6	2.1	50 mM Na^+	2.1	1000
Lauroylsarcosine, Na^+ salt (Sarkosyl)	M	293.4			2	900
Lithium *n*-dodecyl sulfate	M	272.3	6-8	50 mM Na^+		
Lysophosphatidyl-choline (16:0)	M	495.7	0.007		186	92,000
Sodium *n*-dodecyl sulfate (SDS, Lauryl sulfate, Na^+ salt)	M	288.5	2.30	50 mM Na^+	84	24,200
Taurochenodeoxy-	M	521.7				

cholic acid, Na^+ salt						
Taurocholic acid, Na^+ salt	M	537.7	3.3	20 mM Na^+	4	2150
Taurodehydrocholic acid, Na^+ salt	M	531.6				
Taurodeoxycholic acid, Na^+ salt	M	521.7	2.7	50 mM Na^+	8	4200
Taurolithocholic acid, Na^+ salt	M	505.7				
Tauroursodeoxycholic Acid	M	521.7				
Tetradecyltrimethyl-ammonium bromide (TDTAB)	M	336.4	3.5	30° C	81	27,000
TOPPS	M	350.5	4.5	50 mM Na^+		

Zwitterionic Detergents

Detergent Name †	Purity ‡	MW (monomer)	CMC (mM)§	CMC Conditions	Aggreg-ation #	MW (micelle)
BigCHAP	M	878.1	3.4	50 mM Na^+	10	8800
CHAPS	M	614.9	6-10	50 mM Na^+	10	6150
CHAPSO	M	630.9	8	50 mM Na^+	11	9960
DDMAU	M	397.7	0.13	50 mM Na^+		
EMPIGEN BB (N-Dodecyl-N,N-dimethylglycine)	M	272.0	1.6-2.1	50 mM Na^+		
Lauryldimethylamine oxide (LADAO, LDAO, Empigen OB)	M	229.4	1-3	50 mM Na^+	76	17,000
ZWITTERGENT 3-08	M	279.6	330	50 mM Na^+		
ZWITTERGENT 3-10	M	307.6	25-40	50 mM Na^+	41	12,600
ZWITTERGENT 3-12 (3-Dodecyl-dimethylammonio-propane-1-sulfonate)	M	335.6	2-4	50 mM Na^+	55	18,500
ZWITTERGENT 3-14	M	363.6	0.1-0.4	50 mM Na^+	83	30,200
ZWITTERGENT 3-16	M	391.6	0.01-0.06	50 mM Na^+	155	60,700

† BRIJ and TWEEN detergents are registered trademarks of ICI Americas, Inc.; EMPIGEN detergents are registered trademarks of Allbright and Willson; LUBROL is a registered trademark of Imperial Chemical; and ZWITTERGENT is a registered trademark of Calbiochem-Novabiochem Corporation.

‡ "Purity" referrs to the "dispersity" of the detergent preparation. "P" indicates heterogeneity or polydispersity in molecular form, while "M" indicates homogeneity or monodispersity.

§ CMC referrs to the Critical Micellar Concentration, or that total concentration of detergent that corresponds to the maximum possible concentration of detergent monomer in solution. The CMC is very sensitive to temperature and polarity of the medium. The CMC is generally given at 20-25° C, unless indicated otherwise in the table.

References: ***Values in the table were taken from one or more of the following sources***

1. **Biochemistry LabFax, (J.A.A. Chambers and D. Rickwood, eds.), Bios Scientific Publishers, Oxford (Academic Press) (1993).**

2. Calbiochem catalog.

3. Detergents: An Overview, Neugebauer, J. M. (1990) *Methods Enzymol.* 182, 239-253.

4. A Guide to the Properties and Uses of Detergents in Biology and Biochemistry, a handbook from the Calbiochem Company (1987).

5. The Merck Index, Eleventh Edition (S. Budavari, Ed.), Merck and Company, Inc. Publishers, Rahway, New Jersey (1989).

6. Molecular Biology LabFax, (T.A. Brown, ed.), Bios Scientific Publishers, Oxford (Academic Press) (1991).

7. Properties of Detergents, Helenius, A., McCaslin, D. R., Fries, E., and Tanford, C. (1979) *Methods Enzymol.* 56, 734-749.

8. Sigma Chemical Company catalog.

Suggestions for additions or changes can be sent to **Dr. Shaun D. Black** 

Last update June 16, 1998
Shaun D. Black, University of Texas Health Center at Tyler

Enclosure 4 : see pages 4/5

Properties of Detergents

This list is still (and probably will be forever) under construction. At the moment it is a simple compilation of data taken from publications, catalogues etc. I have not remeasured the figures myself nor do I comment on them. The data for a particular detergent depend not only on environmental factors like ionic strength, temperature etc. but the published numbers differ also due to different methods of determining them (for instance ANSA-fluorescence and surface tension measurements for cmc, gelfiltration and small angle scattering for micellar size etc.)!

If you find any errors or if there are detergents missing in the list, please drop me an E-mail. Any comments are welcome!

The following detergent classes are listed below:

Non-ionic Detergents

- 1 Sugar Derivatives
  - 1.1 Alkyl Glucopyranosides
  - 1.2 Alkyl Thio-glucopyranosides
  - 1.3 Alkyl Maltopyranosides
  - 1.3.1 Alkyl Thio-maltopyranosides
  - 1.4 Alkyl Galactopyranosides
  - 1.5 Alkyl Sucroses
  - 1.6 Glucamides
- 2 Oligoethyleneglycol Derivatives
  - 2.1 Alkyl Polyoxyethylenes
  - 2.2 Phenyl Polyoxyethylenes
- 3 Dimethylamine-N-Oxides
- 4 Cholate Derivatives
- 5 n-Octyl Hydroxyalkylsulphoxides
- 6 Sulphobetaines
- 7 Lipid-like Detergents
  - 7.1 Phosphocholine Compounds

Zwitter-ionic Detergents

1 Bile Acids

Ionic Detergents

Non-Ionic Detergents

1 Sugar Derivatives

1.1 Alkyl Glucopyranosides

Name	Molwt.	cmc/mM	cmc/%	AN	Mic.size/kD	Ref.
n-Hexyl-β-D-glucopyranoside (C6-GP)	264.3	250	6.6			[H]
C7-GP	278.3	79	2.2			[H]
C8-GP	292.4	17.4		~80		[C]
		30.3	0.89			#241
		23		78		[I]
		25			8	#220
		23.2, 13.5				#221
		34		27, 75	8, 20	[A]
		20-25		84		[H]
		24.5				[G]
		25.4	0.74	84	25	[E]
C9-GP	306.4	6.5	0.2			#241, [G]
C10-GP	320.4	2-3				[H]
		2.2	0.07			[G]
		4.2				[E]
C12-GP	348.5	0.19	0.007			[G]
		0.14				[E]
		0.13			70	[H]
n-Cyclohexyl-propyl-β-D-glucoside (Cyglu-3)	308.4	28				[G]
C8-glucosylamine (NOGA)	305.4	80	2.4			[H]

1.2 Alkyl Thio-glucopyranosides

Name	Molwt.	cmc/mM	cmc/%	AN	Mic.size/kD	Ref.
n-Heptyl-β-D-thioglucopyranoside (C7-tGP)	274.3	30	0.82			[H]
C8-tGP	308.4	9	0.28			[H]

1.3 Alkyl Maltopyranosides

Name	Molwt.	cmc/mM	cmc/%	AN	Mic.size/kD	Ref.
n-Octyl-β-D-maltopyranoside (C8-M)	454.5	23.4	1.06			[H]
C10-M	482.6	1.6	0.08			[H]

		1.8				[G]
		P.4				[E]
C11-M	496.6	0.59	0.03			[H]
C12-M	510.6	0.15	0.008			#241
		0.16		130	66	[I],235,[C]
		0.16-0.19			50	#220
		0.17				[G]
		0.1-0.6		98	70	[H]
		0.14	0.007	98	50.1	[E]
C13-M	524.6	0.033	0.002			[G]
C14-M	538.6	0.01	0.0005			[G]
Cyclohexyl-methyl-β-D-maltopyranoside (Cymal-1)	438.5	340	14.9			[G]
Cymal-2	452.5	120	5.4			[G]
Cymal-3	466.5	34.5	1.6			[G]
Cymal-4	480.5	7.6	0.37			[G]
Cymal-5	494.5	2.4	0.12			[G]
Cymal-6	508.5	0.56	0.03			[G]
Cymal-7	522.5	0.17				[G]

1.3.1 Alkyl Thio-maltopyranosides

Name	Molwt.	cmc/mM	cmc/%	AN	Mic.size/kD	Ref.
n-Octyl-β-D-thiomaltopyranoside (C8-tM)	308.4	9				[G]
C9-tM	484.6	3.2				[G]
C10-tM	498.6	0.9				[G]
C12-tM	512.7	0.2				[G]

1.4 Alkyl Galactopyranosides

Name	Molwt.	cmc/mM	cmc/%	AN	Mic.size/kD	Ref.
n-Octanoyl-β-D-galactopyranoside	292.4	29.5	0.86			[G]

1.5 Alkyl Sucroses

Name	Molwt.	cmc/mM	cmc/%	AN	Mic.size/kD	Ref.
n-Octanoylsucrose	468.5	24.4	1.14			[H]
n-Decanoylsucrose	496.6	2.5	0.12			[H]
n-Dodecanoylsucrose	524.6	0.3	0.016			[H]

1.6.1 Glucamides

Name	Molwt.	cmc/mM	cmc/%	AN	Mic.size/kD	Ref.
MEGA-8	321.4	58	1.86			[H]
		79	2.54			[G]
MEGA-9	335.5	19-25				[H]

		25	0.84	[G]
MEGA-10	349.5	7	0.25	#241
		6-7		[G], [H]
HECAMEG	335.4	19.5	0.65	#224

1.6.2 Hydroxyethylglucamides

Name	Molwt.	cmc/mM	cmc/%	AN	Mic.size/kD	Ref.
Octanoyl-N-hydroxyethylglucamide (HEGA-8)	351.5	109				[G]
HEGA-9	365.5	39				[G]
HEGA-10	379.5	7.0				[G]
HEGA-11	393.5	1.4				[G]
Cyclohexylethanoyl-HEGA (C-HEGA-8)	349.5	277				[G]
C-HEGA-9	363.5	108				[G]
C-HEGA-10	377.5	35				[G]
C-HEGA-11	391.5	11.5				[G]

2 Oligoethyleneglycol Derivatives

2.1 Alkyl Polyoxyethylenes

Name	Molwt.	cmc/mM	cmc/%	AN	Mic.size/kD	Ref.
C5E1	132.2					[J]
C5E2	176.3					[J]
C5E3	220.3					[J]
C6E1	146.2					[J]
C6E2	190.3					[J]
C6E3	234.3	100	2.34			[J]
C6E4	278.4	90	2.51			[J]
C6E5	322.4	90	2.90			[J]
C7E3	248.4					[J]
C7E4	292.4					[J]
C7E5	336.5					[J]
C8E1	174.3	4.9	0.085			[J]
C8E2	218.3					[J]
C8E3	262.4	7.5	0.19			[J]
C8E4	306.4	7.2	0.22			[J]
C8E5	350.5	4.3	0.15			[C]
		6.0	0.21	32	11	#241, [E]
C8En (Octyl-POE, Rosenbusch-Tens.)						[J]
C10E1						[F]
C10E2						[F]
C10E3						[F]
C10E4	334.5	0.98 (10C)	0.033			[J]

		0.68 (25C)	0.023			[J]
C10E5	378.56	1.18 (10C)	0.045			[J]
		0.81 (25C)	0.031			[J]
C10E6	423	0.46		76	32	[E]
C10E7						[F]
C10E8	511	1.0				[D]
		0.28				[E]
C12E1	230.39					[D]
C12E2	274.45					[D]
C12E3	318.5					[D]
C12E4	362.55					[D]
C12E5	406.61	0.065				[D]
C12E6	450.66	0.068				[D]
	(481)	0.065		105	50	[E]
C12E7	494.72	0.069				[D]
C12E8	538.77	0.071	0.0038			#241,243
		0.08		120		[C]
		0.087		120	65	[K]
		0.07-0.1		120-125		[H]
		0.056		120	65	[E]
C12E9 (THESIT, LUBROL PX)	582.82	0.07-0.1				[H]
C12E10 (GENAPOL C-100)	~627					[H]
C12E23 (BRIJ35)	~1200	0.092		40		[H]
C13E8 (GENAPOL X-80)	~553	0.06-0.15				[H]
C13E10 (GENAPOL X-100)	~641	0.15				[H]
C13E15 (GENAPOL X-150)	~860					[H]
C14E8	567	0.0052				[E]
C16E8	595	0.00047				[E]
PLURONIC F-68	~8400					[H]
PLURONIC F-127	~8400					[H]
TWEEN 20	1228	0.059				[H]
TWEEN 80	1310	0.012		58		[H]

2.2 Phenyl Polyoxyethylenes

Name	Molwt.	cmc/mM	cmc/%	AN	Mic.size/kD	Ref.
Triton X-100	624.9	0.2		140		[C]
		0.21		140	90	[E]
		0.24	0.021			#241
		0.2-0.9		100-155		[H]
		0.3		140	90	[K], [G]
Triton X-100 hydrogenated	631	0.25				[H]

Triton X-114	537	0.2	0.028	#241
		0.35		[H]

3 Dimethylamine-N-Oxides

Name	Molwt.	cmc/mM	cmc/%	AN	Mic.size/kD	Ref.
n-Hexyl-dimethylamine-N-oxide (C6-DAO)	145.25	large		6	0.9	[F]
C7-DAO	159.27	400				[F]
C8-DAO	173.3	180		15	3	[F]
		162	2.8			#241
		175				[E]
		223				[E]
C9-DAO	187.33	50		26	5	[F]
		50.8	0.95			#241
C10-DAO	201	22	0.42			#241
		20		34	7	[F]
		9.1				[E]
		6.0				[E]
C11-DAO	215.38	6		55	12	[F]
C12-DAO (LDAO)	229.4	1.4	0.03			#241
		1.1				[C]
				69	16	[B]
		2.2		75	17.3	[F]
		1-2		76		[H]
		0.48		76	17.3	[E]
		0.23				[E]
C13-DAO	243.44	0.8		107	26	[F]

4 Cholate Derivatives

Name	Molwt.	cmc/mM	cmc/%	AN	Mic.size/kD	Ref.
Big CHAP	878.1	3.4	0.30	10		[H]
Deoxy-Big CHAP	862.1	1.1-1.4	~0.1	10		[H]
Digitonin	1229.3			5-6		[H]

5 n-Octyl Hydroxyalkylsulphoxides

Name	Molwt.	cmc/mM	cmc/%	AN	Mic.size/kD	Ref.
n-octyl-2-hydroxyethyl-sulphoxide	206	30	0.62			[C]
n-octyl-2-hydroxyethyl-sulphide						
n-octyl-rac-2,3-dihydroxy-propyl sulphide						
n-octyl-rac-2,3-dihydroxy-propyl sulfone						
n-octyl-rac-2,3-dihydroxy-						

propyl sulphoxide				
n-octyl-rac-2,3-dihydroxy-propyl sulphonate	236	23	0.54	[C]

6 Sulphobetaines

Name	Molwt.	cmc/mM	cmc/%	AN	Mic.size/kD	Ref.
SB-10	307.6	1.2	0.04			[C]
SB-12	355.6	0.12	0.004			[C]
SB-14	363.6	0.012	0.0004			[C]

7 Lipid-like Detergents

7.1 Phosphocholine Compounds

Name	Molwt.	cmc/mM	cmc/%	AN	Mic.size/kD	Ref.
Fos-Choline-8 (N-Octyl-phosphocholine)	295.4	114				[G]
Fos-Choline-9	309.4	39.5				[G]
Fos-Choline-10	323.4	11				[G]
Fos-Choline-12	351.5	1.5				[G]
Fos-Choline-14	379.5	0.12				[G]
Fos-Choline-16	407.5	0.013				[G]

Zwitter-ionic Detergents

1 Bile Acids

Name	Molwt.	cmc/mM	cmc/%	AN	Mic.size/kD	Ref.
CHAPS	614.9	~8	0.49	10		[G]
CHAPSO	630.9	~8	0.50	11		[G]

Ionic Detergents

1 Negatively Charged

Name	Molwt.	cmc/mM	cmc/%	AN	Mic.size/kD	Ref.
Sodium Dodecyl Sulfate (SDS)	288.38	2.6 (pH7.5)				[G]
		8.27 (H2O)				[G]

= "First choice" detergents for membrane protein crystallization
= Beware! solubility < 2 x cmc!

Detergents on the Net:

Companies

(= Online-Catalog)
- Amersham
- Amresco
- Anatrace
- Boehringer-Mannheim
- Calbiochem
- Dojindo
- Mallinckrodt
- Fluka
- Hampton
- Pfanstiehl
- Pierce
- Sigma

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